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	First Named Inventor	Takaaki Hirai	
	Art Unit	1771	
	Examiner Name	V. S. Chang	
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**ENCLOSURES (Check all that apply)**

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**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT**

Firm Name	RADER, FISHMAN & GRAUER PLLC		
Signature			
Printed name	Lee Cheng		
Date	March 11, 2005	Reg. No.	40,949



Docket No.: APT-0006  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of:  
Takaaki Hirai et al.

Application No.: 09/856,468

Confirmation No.: 6366

Filed: June 7, 2001

Art Unit: 1771

For: PRE-EXPANDED PARTICLES OF  
CRYSTALLINE AROMATIC POLYESTER-  
BASED RESIN, AND IN MOLD EXPANDED  
PRODUCT AND EXPANDED LAMINATE  
USING THE SAME

Examiner: V. S. Chang

**REPLY BRIEF**

MS Appeals-Patent  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

This is a Reply Brief under 37 C.F.R. §41.41 in response to the Examiner's Answer mailed on January 12, 2005.

All arguments presented within the Appeal Brief of November 4, 2004 are incorporated herein by reference. Additional arguments are provided herein below.

In the Examiner's Answer, the Examiner notes that Park et al. teaches a low density foam (i.e.  $27.55 \text{ kg/m}^3 \approx 0.028 \text{ g/cm}^3$ , see Example 4 of Park et al.) of amorphous polyethylene terephthalate copolymer obtained from the copolymerization with 15 to 50% of cyclohexanedimethanol and/or isophthalic acid. Such teachings, the Examiner argues, reads on the limitations "*Pre-expanded foam particles formed from a moldable **crystalline aromatic polyester resin***" and "*the resin contains at least one moiety of a moiety derived from isophthalic acid or a moiety derived from 1,4-cyclohexanedimethanol in a total amount ranging from 0.5 to 10% by weight of the crystalline aromatic polyester resin*". However, Applicant strongly disagrees that such a teaching or suggestion in Park et al. reads on the noted claim limitations.

Park et al. only teach an amorphous polyester (PET) resin obtained from the copolymerization with 15 to 50% of cyclohexanedimethanol and/or isophthalic acid which can be foamed to a low density of 15 pcf (240 kg/m<sup>3</sup>) or less. In other words, Park et al. does not expressly or inherently teach a crystalline polyester resin obtained from the copolymerization with 0.5 to 10% of cyclohexanedimethanol and/or isophthalic acid which can be foamed to a low density of 0.01 to 1.0 g/cm<sup>3</sup>.

Further, Park et al. specifically teaches away from the use of crystalline polyester resin. In column 1, lines 40-46, Park et al. states that “*polyethylene terephthalate (PET) is recognized as a tough, versatile thermoplastic polyester often used for beverage bottles, food trays and custom containers. PET foams have a relatively low thermal conductivity and high barrier or retention qualities. However, PET is very difficult to foam after extruding.*” This, in turn, leads to the discovery in Park et al. that an amorphous polyethylene terephthalate polymer can be foamed to surprisingly low densities, e.g., 15 pcf (240 kg/m<sup>3</sup> or less) (see column 2, lines 25-28, of Park et al.). Hence, since Park et al. concludes that a crystalline polyester resin is not usable for PET foaming and that PET foaming is only achievable by employing amorphous polyester resin, Park et al. cannot be interpreted to read on the limitations “*Pre-expanded foam particles formed from a moldable crystalline aromatic polyester resin*” and “*the resin contains at least one moiety of a moiety derived from isophthalic acid or a moiety derived from 1,4-cyclohexanedimethanol in a total amount ranging from 0.5 to 10% by weight of the crystalline aromatic polyester resin*”.

The Examiner also argues that since Park et al. expressly teaches that greater than 15% comonomers is required to impart amorphous property, Park et al. also implicitly teaches that when the amount of co-monomers (cyclohexanedimethanol and/or isophthalic acid) is less than 15%, the crystallinity of PET is reduced by structural irregularity in polymer chains (i.e. reduced crystallinity), but not to the degree of being fully amorphous. However, such an interpretation does not outweigh the express teachings in Park et al. to use only amorphous and not crystalline polyester resin.

Also, by making such an argument, the Examiner is ignoring those teachings in Park et al. which contradict the Examiner's own interpretations. In other words, the Examiner is picking and choosing specific disclosures in Park et al. to render obvious the present invention even though Park et al. contain disclosures which directly conflict with the Examiner's own interpretation of the reference. It is established law that one cannot use hindsight reconstruction

to pick and chose among isolated disclosures in the prior art to deprecate the claimed invention. *Ecolochem, Inc. v. Southern California Edison Company*, 227 F.3d 1361, 1375, 56 USPQ2d 1065, 1075-76 (Fed. Cir. 2000) (see also *In re Fine*, 837 F.2d 1071, 1075, 5, USPQ2d 1780, 1783 (Fed. Cir. 1988).

It is also important to note that even when assuming that Park et al. implicitly teaches the reduced crystallinity of PET when the amount of co-monomers (cyclohexanedimethanol and/or isophthalic acid) is less than 15%, Park et al. does not teach or suggest the claimed range of 0.5 to 10% by weight of cyclohexanedimethanol and/or isophthalic acid.

In support, in Comparative Example 4 of the present application, a polyester resin which was obtained by copolymerization with cyclohexanedimethanol and isophthalic acid in a total amount of 11.5% was used. Although the total amount (11.5%) of cyclohexanedimethanol and isophthalic acid (co-monomers) is within the range (i.e., less than 15%) implied in Park et al, the resulting pre-expanded particles were poor in dimensional stability and appearance as clearly shown in Table 7 of the present specification. Thus, the results of Comparative Example 4 in the present specification are consistent with the results obtained in Example 4 of Park et al. in which the foam with a density of  $27.55 \text{ kg/m}^3$  ( $\approx 0.028 \text{ g/cm}^3$ ) shrank to 84% of its original volume and have poor dimensional stability. In other words, it is clear that the implicit teachings in Park et al. argued by the Examiner still does not teach or suggest the claimed range of 0.5 to 10% by weight of cyclohexanedimethanol and/or isophthalic acid, or suggest to one skilled in the art that the features of the present invention can be achieved by reducing the amount of the co-monomers.

With regard to the crystallization peak temperature, the Examiner agrees that JP '590 is silent about the exact composition of the polyester resin used for forming the pre-expanded particles and its crystallization peak temperature. To overcome this deficiency in JP '590, the Examiner argues that once a suitable copolyester composition with reduced crystallinity is selected based on the teachings of Park et al., the claimed crystallization peak temperature is either inherent or obviously selected based on the selected copolyester composition. However, based on Applicant's explanation above, a suitable copolyester composition with reduced crystallinity **cannot be selected based on the teachings of Park et al.** as demonstrated in Comparative Example 4 of the present specification and Example 4 of Park et al. As noted above, in Comparative Example 4, a polyester resin obtained by copolymerization with cyclohexanedimethanol and isophthalic acid in an amount (11.5%) within the range (less than

15%) implied by Park clearly do not result in pre-expanded foam particles possessing a crystallization peak temperature between 130 and 180°C since such particles do not possess a fusion ratio of 40% or higher, excellent appearance, dimensional stability and sufficient strength.

Under U.S. case law, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). In relying upon the theory of inherency, the Examiner *must provide a basis in fact and/or technical reasoning* to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. In other words, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency may not, as applicable in this case, be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). Since it cannot be established based on the teachings of Park et al that a crystallization peak temperature in the range of from 130 to 180°C is possessed by its pre-expanded foam particles, such a claimed crystallization peak temperature is not inherently taught or obviously selected by Park et al.

In essence, Applicant believes that the Examiner's assertions about Park et al. amount to nothing more than an "obvious-to-try" situation. Specifically, "an 'obvious-to-try' situation exists when a general disclosure may pique the scientist's curiosity, such that further investigation might be done as a result of the disclosure, but the disclosure itself does not contain a sufficient teaching of how to obtain the desired result, or that the claimed result would be obtained if certain directions were pursued." *In re Eli Lilly & Co.*, 902 F.2d 943, 14 USPQ2d 1741 (Fed. Cir. 1990). Moreover, "an invention is 'obvious to try' where the prior art gives either no indication of which parameters are critical or no direction as to which of many possible choices is likely to be successful." *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 806, 10 USPQ2d 1843, 1845 (Fed. Cir. 1989).

Here, Park et al. does not contain a sufficient teaching of how to obtain the desired result, or that the claimed result would be obtained if certain directions were pursued. "Obvious to try" is not the standard under §103. *In re O'Farrell*, 853 F.2d 894, 903-04, 7 USPQ2d 1673, 1680 (Fed. Cir. 1988).

It is also important to emphasize that the thermoplastic polyester resin disclosed in JP' 590 is a conventionally known ordinary polyester resin having a crystallization peak temperature of 130°C or lower. Pre-expanded particles obtained by foaming a crystalline aromatic polyester resin having a crystalline peak temperature of less than 130°C fails to provide a foam having a fusion ratio of 40% or higher, an excellent appearance and a sufficient strength for the reason outlined of page 5 of the present specification. According to JP '590, it is only possible to produce a foam having a fusion ratio of about 30% by in-mold expansion-foaming (see page 4, line 8 to page 5, line 7 of the present specification) using conventionally known ordinary thermoplastic polyester resin.

For example, in Comparative Example 1 of the present application, when conventionally known ordinary thermoplastic polyester resin is used, the resulting foam has only a fusion ratio of 33% due to the crystallization peak temperature being too low (126.8°C) and the resulting higher speed of crystallization of the resin (see Table 4 of the present specification) thereby resulting in a foam of poor mechanical strength (flexural strength, deflection and the like).

Therefore, it is clear that a crystalline peak temperature of 130 to 180°C is an important requirement for producing a foam having a fusion ratio of 40% or higher by in-mold expansion-foaming of the pre-expanded particles having a bulk density of 0.01 to 1.0 g/cm<sup>3</sup>. Further, given the teachings in JP' 590 and discussion above, it is also clear that both Park et al. and JP '590 fails to teach or suggest, either literally or inherently, the claimed crystallization peak temperature of the present invention.

It should also be noted that in the Examples of JP' 590, the pre-expanded particles produced from the ordinary thermoplastic resin have a reduced crystallinity only in the range of about 8.6% to about 10.5% which is higher than that required by the present claims. According to the present invention, it is possible to control the crystallinity of the pre-expanded particles in the range of 1% to 8% as described in the Examples corresponding to claim 9. For a more detailed discussion regarding these points, please review the Declaration of Mr. Hirai who is the inventor of the present invention and JP '590 which was filed with the Request for Reconsideration dated June 21, 2004.

In support of the rejection of claim 3, the Examiner cites the reference, Allen et al. (U.S. Patent 4,683,247) as proof that it is common knowledge to incorporate small amounts of polytetrafluoroethylene particulates as a foam nucleating agent. However, based on Applicant's

review of Allen et al., the reference still does not teach or suggest “*polytetrafluoroethylene resin in an amount ranging from 0.005 to 0.1 parts by weight based on 100 parts by weight of the crystalline aromatic polyester resin*”.

In Allen et al., polytetrafluoroethylene resin is used together with, for example, amorphous silica or titanium dioxide as a nucleating agent, and the range of amounts of polytetrafluoroethylene resin to be added as the nucleating agent is not particularly described. In Examples 6 and 7 of Allen et al., the nucleating agent actually used is a relatively large amount (i.e. 0.5 parts by weight) of silica.

In contrast, in the present invention, a very small amount (i.e. 0.05 to 0.1 part) of polytetrafluoroethylene is added. When the polytetrafluoroethylene resin is added to an aromatic polyester resin in an amount within the claimed range, the melt tension of the aromatic polyester resin is improved in extrusion foaming as described in the present specification. This effectively improves the stability of the extrusion foaming and, when smaller size cells are formed, prevents breakage of the cells which may otherwise occur due to excessive reduction of cell walls. Allen et al. does not teach or suggests this superior effect described by the present invention.

Thus, based on Applicant's review of Allen et al., the Examiner has not established that it is common knowledge to incorporate small amounts (i.e. claimed amount of 0.05 to 0.1 part by weight) of polytetrafluoroethylene particulates as a foam nucleating agent.

**CONCLUSION**

The prior art of record, either individually or as a whole, fails to disclose, teach or suggest, either literally or inherently, all the features of the claimed invention. Thus, for at least the reasons set forth hereinabove, the rejection(s) of the claimed invention should not be sustained.

Therefore, a reversal of the Final Rejection of August 4, 2004 is respectfully requested.

If any fee is required or any overpayment made, the Commissioner is hereby authorized to charge the fee or credit the overpayment to Deposit Account # 18-0013.

Dated: March 11, 2005

Respectfully submitted,

By 

David T. Nikaido

Registration No.: 22,663

Lee Cheng

Registration No.: 40,949

RADER, FISHMAN & GRAUER PLLC  
1233 20th Street, N.W.  
Suite 501  
Washington, DC 20036  
(202) 955-3750  
Attorneys for Applicant